

### **DETAILED ACTION**

Claims 1, 3, 4, 6-11 and 24-26 are pending.

#### ***Drawings***

Applicant's amendment overcomes the drawing objections.

#### ***Claim Objections***

Applicant's amendment overcomes the previous claim objections.

Claims 4-10 are objected to because of the following informalities: The limitations in claims 4-9, "claims 1-3" should be -- claims 1 and 3 --. The limitation in claim 10, "any one of the above claims" should be - -claims 1 and 4-9 --. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 10 and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 10, lines 2 and 3, the limitation "the obstruction element is displaced to obstruct the flow in a "frictionless free-hanging manner" is not described in the specification using full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use

the same. The specification on page 8, lines 1-8 describe the movement of the obstruction element moving in a plane perpendicular to the flow but does not describe the means to perform this movement. Claim 1 recites an actuator, but it is unclear as to how the actuator is displaces the obstruction in a frictionless manner.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,3,6,10,11, 24 and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Kluge et al. (6,131,879).

Kluge et al. disclose a microvalve (Figures 2A,B) for providing flow regulation suitable for use in a microsystem comprising, a first substrate layer 34 defining a first plane, a second layer 12,20 disposed over the first substrate layer cooperating with the first substrate layer to form a flow duct through which the flow traverses thereby defining a direction of main flow in the flow duct, parallel to the first plane, an obstruction element 14 introducible in the flow duct defined by the second layer for obstructing the flow, the obstruction element being displaceable in a moving direction substantially perpendicular to the direction of main flow and out of plane with respect to the first substrate layer such that a force on the obstruction element caused by the flow when the obstruction element is obstructing the flow is substantially in the direction of main

flow, and actuator means 10 operative on the obstruction element for controllably displacing the obstruction element to regulate the flow.

Regarding claim 3, Kluge et al. disclose that the external actuator means is attached to the obstruction element operative for controllably displacing the obstruction element to regulate the flow (Col. 4, Lns. 58-59).

Regarding claim 6, Kluge et al. disclose that the microvalve is actuated using piezoelectric actuation means (Col.4, Ln.54).

Regarding claim 10, Kluge et al. disclose that the obstruction element is displaced with respect to the first substrate layer and the second layer, respectively, to obstruct the flow in a frictionless "free-hanging" manner in order to avoid tribological effects during operation (as shown 14 moves essentially without friction).

Regarding claim 11, Kluge et al. disclose that the "free-hanging" obstruction element, when in a closed position, is laterally moved a small distance in a direction substantially parallel to the direction of the direction of the flow against a jam formed from the second layer to reduce or block off any leakage flow (as shown in Figures 2A and 2B the element 14 moves parallel to flow and "against a jam" in as much the same manner as does applicant's device).

Regarding method claims 24 and 25, the device shown by Kluge et al. will perform the methods as recited in claims 24 and 25, during normal operational use of the device.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kluge et al. '879 in view Jerman ("Electrically-Activated, Micromachined Diaphragm Valves," Hal Jerman, Technical Digest IEEE, Sensor and Actuator Workshop, Jun. 1990, pp. 65-69.).

Kluge et al. is silent to having an actuator means is a thermal bimorph actuator comprising materials with different thermal expansion coefficients such as aluminum bonded together with the material from the second layer, wherein a controllable temperature change causes the bimorph actuator to bend due to the difference in thermal coefficients of expansion between the materials.

Jerman discloses a microvalve which teaches the use an aluminum layered thermal responsive actuator (page 66, Para.1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute a thermal actuator as taught by Jerman to close the valve (Col.1, Lns. 59-61).

Regarding method claim 26, the device shown by Kluge et al. in combination with Jerman will perform the methods as recited in claim 26, during normal operational use of the device.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kluge et al. '879.

Official Notice is hereby taken that it is widely known in the microvalve fluid handling art to use magnetic, electrostatic, and thermal actuation means such as monomorph expansion, shape memory, or thermopneumatic means situated as actuation devices, to deflect or move the valve member to restrict or close a valve opening.

#### ***Response to Arguments***

Applicant's arguments filed 12/15/2009 have been fully considered but they are not persuasive. Applicant's arguments regarding claims 10 and 11 are not persuasive, as in claim 10, the limitation "the obstruction element is displaced to obstruct the flow in a "frictionless free-hanging manner" is not described in the specification using full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same. It is unclear as to how the obstruction element is displaced in a frictionless manner.

Applicant's argument that the present invention discloses one single direction of main flow along a flow axis is not persuasive, as in the preamble of the claim 1, the limitation "comprising" is considered as open language and therefore the fact that the Kluge reference provides other flow paths is immaterial.

The argument that Kluge does not show "a microvalve comprising a first layer defining a first plane and a second layer disposed over the first substrate layer cooperating with the first substrate layer to form a flow duct through which the flow traverses thereby defining a main flow along a flow axis" is not persuasive. Kluge has a first layer 34 and a second layer 12 disposed over the first layer, this area between the two layers which is parallel to the first layer forms the main flow duct, defines a main flow axis parallel to the first layer. The main flow is considered as running parallel with the first layer 34 between ports 30 and 32.

Applicant's argument that "the Kluge patent does not show an obstruction element for obstructing flow that is displaceable such that a force on the obstruction element caused by the main flow when the obstruction element is obstructing the flow substantially in the direction of the main flow" is not persuasive. The obstruction element 14 of Kluge moves perpendicular to the flow axis which is between the two layers 12 and 34, a force of the flow certainly is applied to the vertical face to the right side of 14.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig Price whose telephone number is (571)272-2712. The examiner can normally be reached on 8AM - 4:30PM Mon-Fri, Increased flex time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans can be reached on (571) 272-4777. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CP 27 March 2010

/C. P./Examiner, Art Unit 3753

/Robin O. Evans/  
Supervisory Patent Examiner, Art Unit 3753